Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

EDITORIAL – BREAST ONCOLOGY

Intraoperative Margin Assessment in Breast Conservation Surgery: A Necessity or a Luxury?

Srijan Shukla, MS, DNB, FEBS[ID]**, and Nisha Hariharan, MS, HBNI**

Department of Surgical Oncology, Basavatarakam Indo American Cancer Hospital and Research Institute, Hyderabad, India

The goal of breast conservation surgery (BCS) is to achieve two equally important tasks: an accurate and complete clearance of the cancer and maintaining a good cosmetic outcome. It is of utmost importance that one must not take precedence over the other. Achieving a negative resection margin but failing to offer an acceptable cosmetic outcome is not ideal. Even less so is having to perform a reoperation for a positive resection margin. Not all patients needing reoperation for margin revision qualify for a redo BCS, and some have to undergo a mastectomy instead. Reoperation can be physically and mentally discomforting to the patient, and the financial burden of such procedures has been well documented.[1] If oncoplastic surgery (OPS) was employed in the first attempt, the revision surgery could potentially undo the previous reconstruction and cause a delay in initiating adjuvant treatment. After the SSO/ASTRO revision of the margin guidelines published in 2014, the overall reoperation rates have reportedly decreased from 20.2 to 16.5%.[2] While the decreasing trend is encouraging, the overall number of patients needing reoperations continues to be unreasonably high.

Ever since Pusic et al. published the validated questionnaire BREAST-Q PRO in 2009, the awareness and emphasis on quality of life (QoL) parameters in breast cancer survivorship has evolved.[3] Initially designed to test outcomes of different surgical strategies, BREAST-Q PRO has been studied across different languages, cultures, and even non-surgical therapies in breast cancer. Specifically for surgeons, it has acted as a catalyst for rapid development, training, and auditing in BCS and OPS reconstruction techniques.

In an interesting paper titled "The Impact of Breast-Conserving Surgery Re-excision on Patient-Reported Outcomes Using the BREAST-Q," Matar et al. compared the BREAST-Q PRO results between patients undergoing a single BCS surgery with patients requiring two or more BCS surgeries to achieve negative resection margins.[4] Breast satisfaction and sexual well-being scores were found to be lower in the redo BCS group at 2 years postoperatively, although this difference did not carry forward in the 5-year analysis. Psychosocial well-being scores were not found to be different in the two groups. The study is unique as it has prospectively collected surveys from a large sample of patients including 564 patients of redo BCS. The findings provide further evidence of the detrimental effects of reoperations on the quality of life of survivors of breast cancer. As such, these results will assist surgeons in offering better counsel and informed advice to women should the need for a margin revision arise.

Redo BCS will result in a larger defect, thus necessitating breast reconstruction more often. Considering the training and services for complex OPS are not uniformly available, redo BCS without reconstruction could potentially lead to poorer BREAST-Q scores. It would further contribute to our understanding if the proportion of patients requiring breast reconstruction is compared between the two groups of index BCS versus redo BCS.

To paraphrase a famous quote by Lord Kelvin, if we can measure something, we can improve upon it. In the last decade, the published literature on the harms of redo BCS has grown, thereby making it incumbent upon breast cancer surgeons to take responsibility to minimize the need for such revisions.

S. Shukla, MS, DNB, FEBS
e-mail: shuklasrajan@gmail.com; shuklasrijan@proton.me

Intraoperative margin assessment is a time-tested technique with the advantage of allowing margin revisions in the same procedure. A frozen section analysis could be instrumental in reducing the need for additional procedures, particularly in women undergoing complex oncoplastic surgeries. In situations in which the availability of a qualified pathologist forbids a frozen section for every patient, one could adopt alternatives, such as imprint cytology or cavity shaving, if feasible. It might also be prudent for a breast cancer surgeon to identify the women who are likely to have diffuse microscopic disease and request for a frozen section on a case-to-case basis. A multidisciplinary approach with close coordination with the radiology team would be immensely useful in identifying such women. Availability of a trained pathologist/cytopathologist, false negative rates, and limited feasibility in high-volume clinical workflows are the commonly quoted reasons for not opting for these options. Alternatively, ex vivo imaging of the specimen via radiography or ultrasound could help in situations of women with non-palpable circumscribed lesions undergoing breast conservation surgery. It would serve to assist the surgeon with a visual image of the extent of the excised lesion, allowing for modifications in the surgery, if required. In continuation with this concept, upcoming systems are employing radiofrequency spectroscopy and optical coherence tomography to give a rapid on-site diagnosis of the margin status, allowing the surgeon to act and improve the accuracy of the excision as needed. These systems carry the added advantage of being surgeon-operated, thereby avoiding any dependency on collaborative departments in the hospital.[5] Among the more interesting advances is the incorporation of machine learning (ML) and artificial intelligence (AI) in pathology, digital pathology is a powerful tool and is showing promise in the field of frozen section analysis. Machine learning algorithms can train on datasets using digitized frozen section images and learn to distinguish between normal and malignant tissue. AI systems can then analyze such images in real time, allowing pathologists and surgeons to make informed decisions about surgical management. While such technology is only in its nascent stage at present, recent results have been very promising. One recent study reported the diagnostic capability of deep learning in assessing slides of frozen tissue section analyzing sentinel lymph node biopsy in breast cancer.[6]

Reoperation rates after BCS have previously been proposed to be seen as a quality measure.[7] With the results of Matar et al., there is tangible evidence for the inclusion and assessment of quality-of-life parameters as a function of redo surgery. The onus falls on the breast surgical community to focus on improving the accuracy of breast conservation procedures with the aim of delivering improved outcomes and providing optimum patient satisfaction.

DISCLOSURE The authors declare no conflicts of interest.

REFERENCES

1. Grant Y, Al-Khudairi R, St John E, Barschkett M, Cunningham D, Al-Mufti R, et al. Patient-level costs in margin re-excision for breast-conserving surgery. *Br J Surg*. 2019;106(4):384–94.
2. Schulman AM, Mirrielees JA, Leverson G, et al. Reexcision surgery for breast cancer: an analysis of the American society of breast surgeons (ASBrS) Mastery^SM Database following the SSO-ASTRO "No Ink on Tumor" Guidelines. *Ann Surg Oncol*. 2017;24(1):52–8. https://doi.org/10.1245/s10434-016-5516-5.
3. Pusic AL, Klassen AF, Scott AM, Klok JA, Cordeiro PG, Cano SJ. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg*. 2009;124(2):345–53.
4. Matar-Ujvary R, Haglich K, Flanagan MR, et al. The impact of breast-conserving surgery re-excision on patient-reported outcomes using the BREAST-Q. *Ann Surg Oncol*. 2023. https://doi.org/10.1245/s10434-023-13592-3.
5. Pradipta AR, Tanei T, Morimoto K, Shimazu K, Noguchi S, Tanaka K. Emerging technologies for real-time intraoperative margin assessment in future breast-conserving surgery. *Adv Sci*. 2020;7(9):1901519.
6. Kim YG, Song IH, Cho SY, Kim S, Kim M, Ahn S, et al. Diagnostic assessment of deep learning algorithms for frozen tissue section analysis in women with breast cancer. *Cancer Res Treat*. 2023;55(2):513–22.
7. Elmore LC, Margenthaler JA. A tale of two operations: re-excision as a quality measure. *Gland Surg*. 2019;8(6):59395–595.